

1. Anne Marie decides to drive to her grandmother's house over two days. The first day she drives 420 miles in 7 hours. The second day she drives 285 miles in 5 hours. What is her average speed for the entire trip?

- ☐ A 57 miles per hour  
☒ B 58.5 miles per hour  
☐ C 58.75 miles per hour  
☒ D 60 miles per hour

$$v_1 = \frac{420}{7} = 60 \text{ mph} \quad v_2 = \frac{285}{5} = 57.5 \text{ mph}$$

$$v_{\text{Avg}} = \frac{v_1 \cdot t_1 + v_2 \cdot t_2}{t_1 + t_2} = \frac{60 \cdot 7 + 57.5 \cdot 5}{7 + 5} = \frac{420 + 287.5}{12} = 58.75 \text{ mph}$$

2. Multiply.

$$(x + 9)(x - 11) = \cancel{xx} - \underline{11x} + \underline{9x} - 99 = x^2 - 2x - 99$$

- ☐ A  $x^2 + 9x - 11$   
☐ B  $x^2 - 99$   
☐ C  $x^2 + 9x - 99$   
☒ D  $x^2 - 2x - 99$

3. Simplify:

$$\left( \frac{p^{-1}q^2}{pq^{-3}} \right)^3 \quad \left( p^{-1-1} q^{2-(-3)} \right)^3 = (p^{-2} q^{2+3})^3 = (p^{-2} q^5)^3 = \left( \frac{q^5}{p^2} \right)^3 = \frac{q^{15}}{p^6}$$

Assume that no variable is equal to zero.

- ☐ A  $\frac{q^{18}}{p^3}$   
☒ B  $\frac{q^{15}}{p^6}$   
☐ C  $\frac{q^8}{p^5}$   
☐ D  $\frac{q^5}{p^2}$

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4. A farmer needs to paint the exterior of an old grain silo on his farm. The silo has an 8-foot radius and the sides are 20 feet tall. The top of the silo is a hemisphere with an 8-foot radius. How many square feet will the farmer have to paint? Use 3.14 for  $\pi$ .

- ✓ A 1,406.72 square feet  
B 1,808.64 square feet  
C 2,210.56 square feet  
D 5,090.99 square feet



CYLINDER  $R = 8\text{ ft}$   $h = 20\text{ ft}$

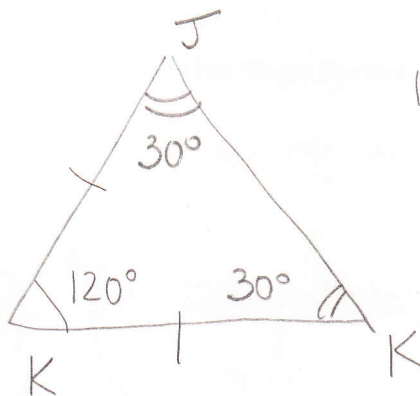
$$SA_{\text{cyl}} = 2\pi R^2 + 2\pi R h = 2 \cdot 3.14 \cdot 8^2 + 2 \cdot 3.14 \cdot 8 \cdot 20 = 1406.72 \text{ ft}^2$$

$$r = 8\text{ ft} \quad SA_{\text{hem}} = \frac{4\pi r^2}{2} = \frac{4 \cdot 3.14 \cdot 8^2}{2} = 401.92 \text{ ft}^2$$

$$SA = SA_{\text{cyl}} + SA_{\text{hem}} = 1406.72 + 401.92 = 1808.64 \text{ ft}^2$$

5.  $\triangle JKL$  is isosceles. The measure of  $\angle K$  is  $120^\circ$ . What is the measure of  $\angle J$ ?

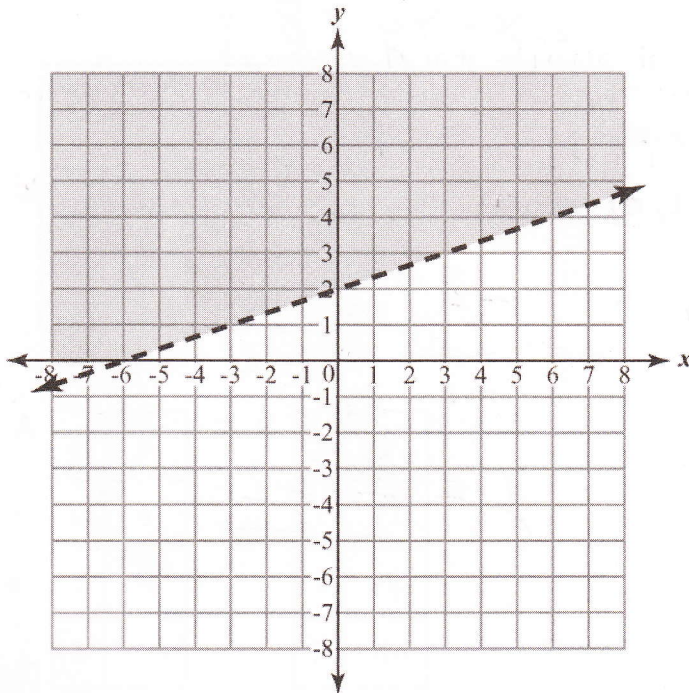
- ✓ A  $30^\circ$   
B  $90^\circ$   
C  $60^\circ$   
D  $120^\circ$



$$\frac{180^\circ - 120^\circ}{2} = \frac{60^\circ}{2} = 30^\circ$$

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6. Look at this graph.



$$y > \frac{2}{3}x + 2$$

$$y > \frac{1}{3}x + 2$$

$$3 \cdot y > 3 \cdot \frac{1}{3}x + 2 \cdot 3$$

$$3y > x + 6$$

$$-x + 3y > 6$$

$$x - 3y < -6$$

Which of these linear inequalities represents the graph?

- ☐ A  $x - 3y > -6$   
☐ B  $x - 3y \leq -6$   
☒ C  $x - 3y < -6$   
☐ D  $x - 3y \geq -6$

7. Mr. Delfino's math class recently took a test. He displayed the class's test results in the stem-and-leaf plot below. What was the **median** score on the exam?

Stem	Leaf
6	2 8
7	0 1 1 4 4 6 8
8	2 6 7 9
9	0 0 3 3 4 5 8

$$\frac{82 + 86}{2} = 84$$

- ☐ A 62  
☐ B 82  
☒ C 84  
☐ D 90

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8. Look at this linear equation.

$$2x - 4y = 8$$

What is the y-intercept of the line represented by the equation?

- A -4  
☒ B -2  
 C 8  
 D  $\frac{1}{2}$

$$2x - 4y = 8$$

$$-x - 2y = 4$$

$$\frac{-2y}{-2} = \frac{-x + 4}{-2}$$

$$y = \frac{x}{2} - 2$$

9. Shondra randomly draws a marble from a bag, records its color, and then replaces the marble. After 100 draws, she records drawing a green marble 12 times, a red marble 55 times, a blue marble 15 times, a purple marble 2 times, and a yellow marble 16 times. If Shondra were to draw one more time, what is the expected probability that she will draw a red marble based on the data?

- A  $\frac{3}{20}$   
 B  $\frac{9}{20}$   
☒ C  $\frac{11}{20}$   
 D  $\frac{17}{20}$

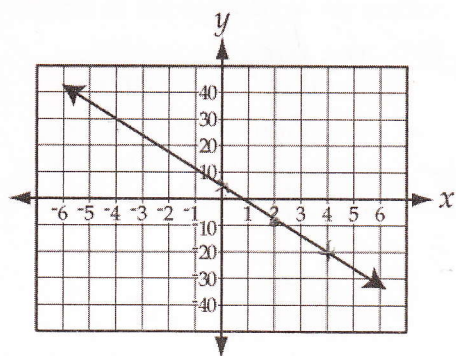
$$12 + 55 + 15 + 2 + 16 = 100$$

$$\frac{55}{100} = \frac{11}{20}$$

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10. Match the graph of the given function to its table.



CHECK THE POINTS ON THE GRAPH

✓ A

$x$	$y$
0	4
2	-8
4	-20

C

$x$	$y$
1	-2
2	-8
3	-20

B

$x$	$y$
-4	28
-1	10
0	-4

D

$x$	$y$
-5	26
-2	-8
0	-4

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11. Solve  $3x^2 + 7x - 20 = 0$  for  $x$ .

A  $x = \left\{ -\frac{5}{3}, 4 \right\}$

B  $x = \left\{ \frac{4}{3}, -5 \right\}$

C  $x = \left\{ -\frac{4}{3}, 5 \right\}$

✓ D  $x = \left\{ \frac{5}{3}, -4 \right\}$

① GRAPH

② plug in the values

$$3 \cdot \left( \frac{5}{3} \right)^2 + 7 \cdot \frac{5}{3} - 20 = 0$$

12. Two students are randomly picked from a group of 12 students to become president and vice president of the student government. Yassein and Jackie are 2 of the 12 people from which to choose. What is the probability that Yassein and Jackie will become president and vice president?

A  $\frac{1}{72}$

B  $\frac{25}{33}$

C  $\frac{55}{72}$

✓ D  $\frac{1}{66}$

Y J

$$12 \times 11 = 132$$

1 2	2 3	3 4	4 5	5 6	6 7	7 8
1 3	2 4	3 5	4 6	5 7	6 8	7 9
1 4	2 5	3 6	4 7	5 8	6 9	7 10
1 5	2 6	3 7	4 8	5 9	6 10	7 11
1 6	2 7	3 8	4 9	5 10	6 11	7 12
1 7	2 8	3 9	4 10	5 11	6 12	(5)
1 8	2 9	3 10	4 11	5 12	(6)	
1 9	2 10	3 11	4 12	(7)		
1 10	2 11	3 12	(8)			
1 11	2 12	(9)				
1 12	(10)					

(11) + (10) + (9)

8 9  
8 10  
8 11  
8 12  
(4) +

9 10  
9 11  
9 12  
(3) +

10 11  
10 12  
(2) +

11 12  
(1) +

= 66

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13. A company is creating a capsule for a new vitamin. The capsule has the shape of a cylinder that is 10 mm long and 5 mm wide. At each end of the cylinder is a hemisphere that is also 5 mm wide. What is the volume of the capsule, to the nearest tenth? Use calculator  $\pi$  or use  $\pi = 3.14159$ .

- A 1309.0 cubic millimeters  
B 235.6 cubic millimeters  
✓ C 261.8 cubic millimeters  
D 157.1 cubic millimeters

5 mm



$$R = 2.5 \text{ mm}$$

$$h = 10 \text{ mm}$$

$$V_{\text{cyl}} = \pi R^2 \cdot h =$$

$$= 3.14159 \cdot 2.5^2 \cdot 10 = 196.35$$

$$V_{\text{H.S}} = \frac{4}{3} \cdot \frac{\pi R^3}{2} = \frac{4 \cdot 3.14159 \cdot 2.5^3 \cdot 2}{6} =$$

14. Look at these monomials.

$$128x^6y^5z^3$$

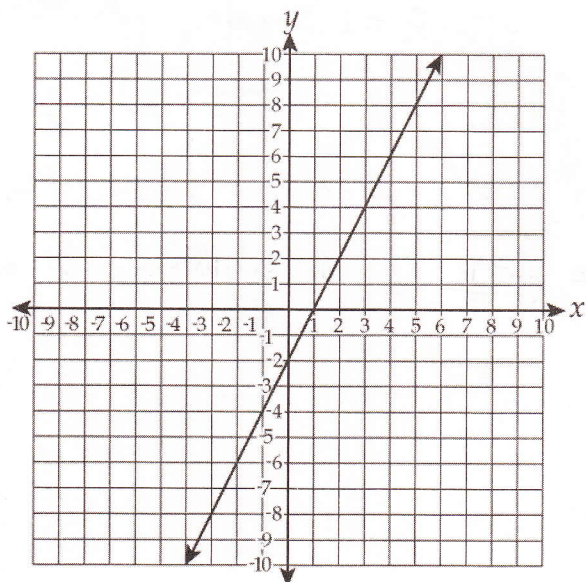
$$216x^2y^7z^4$$

What is the greatest common factor of the monomials?

- ✓ A  $128x^6y^7z^4$   
B  $8x^6y^5z^3$   
C  $27x^2y^7z^4$   
✓ D  $8x^2y^5z^3$

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15. Which equation in slope-intercept form is for the line that is perpendicular to the line  $y = 2x - 2$  and has a  $y$ -intercept of 3?



$$y = 2x - 2$$

$$m_1 = 2$$

$$m_2 = -\frac{1}{2}$$

$$y = -\frac{1}{2}x + 3$$

✓ A  $y = -\frac{1}{2}x + 3$

B  $y = -2x + 3$

C  $y = \frac{1}{2}x + 3$

D  $y = 2x + 3$

16. Which of these equations represents the line that passes through the points (1, 3) and (3, 1)?

✓ A  $y - x = 4$   
 B  $y + x = 4$   
 C  $y + x = -4$   
 D  $y - x = -4$

$$y - x = 4$$

$$+ x \quad + x$$

$$y = x + 4$$

$$y + x = 4$$

$$- x \quad - x$$

$$y = -x + 4$$

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17. Which set of data has a median of 5?

- A 1, 1, 4, 7, 8, 9
- B 1, 2, 2, 4, 5, 6
- C 2, 5, 5, 6, 8, 9
- ✓ D 3, 3, 4, 6, 7, 9

$$\text{median} = \frac{4+6}{2} = 5$$

18. The length ( $l$ ) and width ( $w$ ) of a given figure can be determined by the inverse variation  $l \times w = 40$ . If the length of the figure is doubled, what happens to the width?

- ✓ A The width is halved.
- B The area will double.
- C The width is doubled.
- D The width remains the same.

$$l \times w = 40 \quad w = \frac{40}{l}$$

$$2l \times w = 40$$

$$w = \frac{40}{2l}$$

19. Stephen wants to go to the movies and go out to eat for his birthday. There are 6 movies and 4 restaurants that he likes. If Stephen sees 2 movies and eats at 1 restaurant, how many different movie and restaurant combinations are possible?

- ✓ A 24
- B 60
- C 120
- D 144

1	2	3	4	5	6
12	23	34	45	56	
13	24	35	46		
14	25	36			
15	26				
16					
+	2	3	4		

15

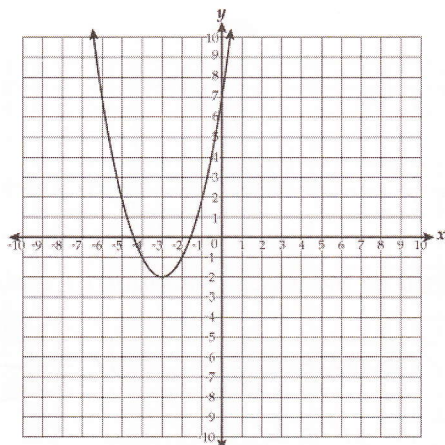
$$15 \cdot 4 = 60$$

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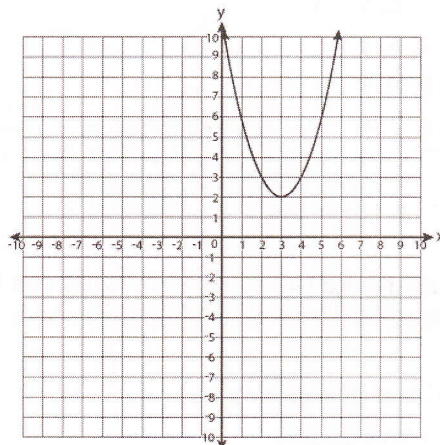
20. Which of these is the graph of the equation  $y = (x + 3)^2 - 2$ ?



A

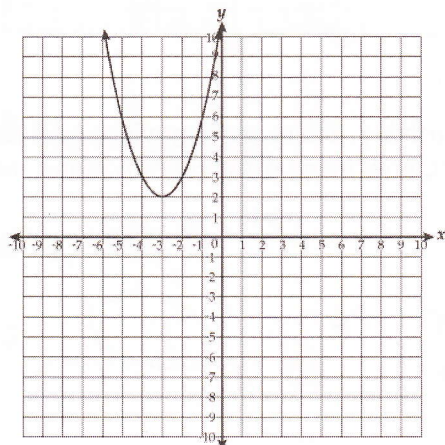


C

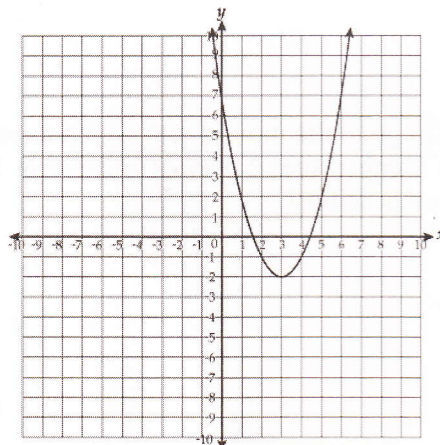


Graph

B



D



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21. Look at this function.

$$f(x) = \frac{x^2 - 1}{x + 1}$$

What is the domain of the function?

- A all values of  $x$  except 1  
B only the value of  $x = -1$   
C only the value of  $x = 1$   
✓ D all values of  $x$  except  $-1$

$x \neq -1$   
cannot divide by 0

$$x + 1 \neq 0$$

$$-1 -1$$

$$x \neq -1$$

22. A fair number cube is labeled from 1 to 6. What is the probability that a 2 or a 4 will come up if the number cube is rolled?

A  $\frac{1}{6}$

✓ B  $\frac{1}{3}$

C  $\frac{1}{2}$

D  $\frac{2}{3}$

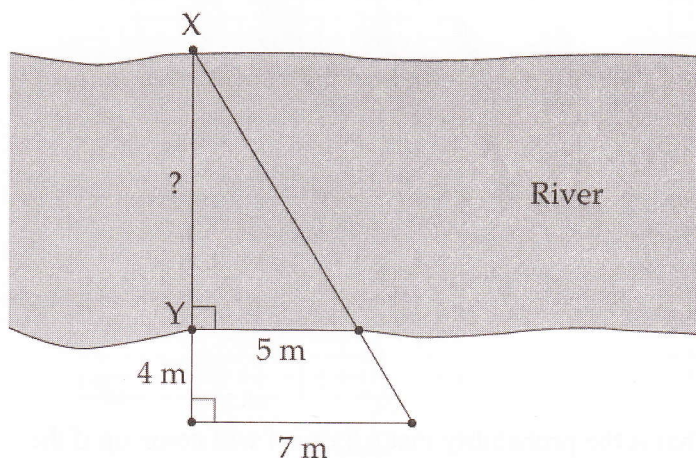
1 2 3 4 5 6

$$\frac{2}{6} = \frac{1}{3}$$

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23. David's class tried to estimate the distance across a river. They placed markers at points X and Y to represent the distance across the river. They placed three more markers and measured the distances, as shown in the diagram below.



[not drawn to scale]

$$\frac{d}{5} = \frac{d+4}{7}$$

$$7d = 5(d+4)$$

$$7d = 5d + 20$$

$$2d = 20$$

$$d = 10 \text{ m}$$

Use the proportion  $\frac{d}{5} = \frac{d+4}{7}$  to find the estimated distance,  $d$ , across the river.

- A 2 meters
- B 8 meters
- ✓ C 10 meters
- D 14 meters

24. A carpenter increases the size of a room from a square with sides of 10.75 feet to a rectangle with a width of 15.3 feet and length of 17.9 feet. Which of these is about how much the area of the room increased?

- A 391 square feet
- B 121 square feet
- ✓ C 270 square feet
- D 149 square feet

$$10.75^2 = 115.5625$$

$$15.3 \cdot 17.9 = 273.87$$

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25. Look at this table.

$x$	$y$
-2	9
-1	7
0	5
1	3
2	1

Which equation matches the data given in the table?

- ☐ A  $y = 2x - 5$   
☐ B  $y = -5x + 2$   
☒ C  $y = -2x + 5$   
☐ D  $y = 5x - 2$

graph. calculator - Table  
or make equation -  
-line of best fit

26. Look at this set of data.

1, 11, 13, 16, 18, 27, 27, 31

What is the interquartile range of the data?

- ☒ A 12  
☒ B 15  
☐ C 27  
☐ D 30

calc.  $Q_1 = 12$   $Q_3 = 27$   $IQR = 15$

27. Which equation is equivalent to  $x^2 + 5x - 14 = 0$ ?

- ☐ A  $(x + 5)(x - 9) = 0$   
☐ B  $(x + 5)(x - 14) = 0$   
☐ C  $(x - 7)(x + 2) = 0$   
☒ D  $(x + 7)(x - 2) = 0$

graph calc.  
or factor  
 $(x + 7)(x - 2) = 0$

check  $x^2 - 2x + 7x - 14 = 0$   
 $x^2 + 5x - 14 = 0$

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28. Look at this set of data.

12, 55, 88, 89, 89, 90, 92, 94, 96, 98, 100

What would happen to the value of the mode if you removed 12 from the data set?

- ✓ **A** It would remain at 89.  
**B** It would increase by 1.  
**C** It would decrease by 43.  
**D** It would increase by about 7.

29. Simplify.

$$\frac{\frac{x^2+5x+6}{x+2}}{\frac{x^2+9x+20}{x+4}}$$

- ✓ **A**  $\frac{x+3}{x+5}$   
**B**  $\frac{x+2}{x+4}$   
**C**  $(x+3)(x+5)$   
**D**  $\frac{x+5}{x+3}$

$$\begin{aligned} x^2 + 5x + 6 &= (x+2)(x+3) \\ x^2 + 9x + 20 &= (x+4)(x+5) \\ \frac{(x+2)(x+3)}{(x+4)(x+5)} &= \frac{x+3}{x+5} \end{aligned}$$

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30.

$$\frac{(-3)^3 \div \frac{1}{4}}{2 \times 5 - 1}$$

A -13.5

✓ B -12

C 0.25

✓ D 4